

olive of Lockhart Clarke. For the rest, M. Duval's description is very nearly that of Meynert, except that for the facial, as well as for the hypoglossal, he does not believe in the existence of direct radicular fibres.

RAPIDITY OF TACTILE SENSATIONS.—At the session of the French Acad. of Sciences, June 5, (rep. in *La France Médicale*) M. Claude Bernard presented a communication by M. L. Lalanne, of which the following abstract gives the principal points.

Let us suppose that we give to a flexible body, contact with which is not of a kind to injure the skin, a rapidly rotating motion around the arm, or leg, immovably fixed. Now, if the contact at each point is made within a sufficiently short time, shorter than the duration of the impression produced, then by analogy with the visual sense, we might expect there would be a continuous sensation of contact over the whole tract touched. M. Lalanne followed up this induction, and found it sufficiently correct for his purposes. The results of his experiments, thirty-three in number, are summed up in the following conclusions:

1. A continuous sensation is never felt with less than ten revolutions per second. The duration of the sensation produced is therefore not over one-tenth of a second, and in some cases it is less.
2. The shortest duration observed was from one twenty-fourth to one twenty-fifth of a second.
3. This minimum of duration varies in different individuals, and in different parts of the body.

THE SENSIBILITY OF THE DURA MATER.—At the session of the Soc. de Biologie, June 17, (rep. in *Le Progrès Médical*), M. Bochefontaine gave the results of experiments on the sensibility of the dura mater in animals anesthetized, or curarized. When we seize the dura mater with a pin-cette, we see movements produced, sometimes in the face, sometimes in the members. In the limbs they are generally, and sometimes exclusively, on the same side as that of the irritated portion of the membrane. These phenomena should undoubtedly be considered as reflex.

M. Lepine, in repeating the experiments of M. Brown-Séquard on the cauterization of the meninges, had arrived at analogous results; but instead of referring them like M. Brown-Séquard, to a direct action, he was of the same opinion as M. Bochefontaine, and included them among the reflexes.

THE NERVE TERMINATIONS IN THE ELECTRIC APPARATUS OF THE TORPEDA.—The following is the substance of a recent communication to the Acad. des Sciences at Paris, by M. Ch. Rouget, as reported in *L'Union Médicale*.

"At the session of the 20th of last December, M. Claude Bernard presented a note of M. Ranvier, according to which the terminal plexus described and figured by Kelliker, by M. Schultze, and by Boll, does not exist; the termination of the nerves in the nervous portion of the electric plate is found by a series of branches ending in button-like enlargements, as has been shown before by Remak; a fine and regular granulation described by Remak and Boll, covers both branches and enlargements.

"M. Ranvier might have added my name to those of the observers who have confirmed the existence of the terminal plexus discovered by K  lliker. After Max Schultze, (1862,) but previous to Boll, (1873,) in 1866, I published on this subject, in the *Bulletin de l'Acad  mie de M  decine*, a note, stating that I have observed in the plates of the electric organ of the torpedo, taken from the living animal, a terminal plexus, resembling very fine bone lace, and formed by the cylinder axes of the pale fibres. I have been able, even, thanks to the aid of my colleague, Prof. Moitiersier, to photograph the image of this plexus. Later, during the spring of 1872, I succeeded in obtaining preparations of this plexus, and of the mode of the terminations of the nerves of the electric organs of the torpedo, clear, demonstrative, and easily preserved, by treating fragments of the organ, taken from the animal while living, with concentrated (7-100,) and even supersaturated solutions of nitrate of silver. If I did not then publish these results, it was because I considered the existence of the nervous plexus in the electric disks as one of the facts of science, sufficiently tested and confirmed to be placed beyond dispute.

"To-day, since M. Ranvier has re-opened the question, it seems to me desirable to make known the procedure by which it is possible to make an end of all controversy on this subject. It is worth while to remark, that Remak has not drawn from his observations the conclusions attributed to him by M. Ranvier; we may judge this from the following passages relative to the appearances presented by the nerve terminations in the electric organs of the torpedo:

"We see little rounded, or angular figures, and, if we follow their delicate contours, we perceive that they are branches of nerve fibres, which cross among themselves in the same manner as the larger fibres, and give rise to the same appearance of anastomoses in plexuses; * * * the spaces between the fine fibres seem in places like rounded, transparent vesicles. How do the thin fibres terminate? According as the little angular rings, corresponding to the spaces between the terminal ramifications, appear more clearly, does the appearance of granulations that we seemed to behold previously, disappear. It is true that an illusion is possible, since, the fibres parallel to the surface may present the same aspect, I admit that here I cannot trust my lenses further.'

"I think we can legitimately infer, from the above, that Remak saw, or rather had a glimpse of, the terminal plexus, and that he gave it a wrong interpretation by reason of illusions that he himself admitted to be possible. He speaks of granulations only as being false appearances. As to a termination of the branches in button-like enlargements, let us see what he actually did say.

"On the other hand, I have frequently seen the finer fibrils ending in a *pestle shaped*, or *truncated* extremity, like those of the radiating fibres of Muller, which form the limiting membrane of the retina.'

"He thus speaks not only of an arrangement that is not constant, but the very comparison which he employs shows that he did not intend to speak of a termination in free extremities.

"The treatment with nitrate of silver, which I have above alluded to, fol-

lowed by exposure in glycerine to diffused light, enables us to isolate the layers composed of the nervous terminal plexus alone. We see the spaces of the meshes of this plexus colored black by the silver precipitate, while the nervous fibres which form the rounded, or polygrual meshes, remain uncolored, and appear in relief, thanks to their refractile power. Here and there the meshes are dotted with clear stellate bodies, with numerous ramifying branches, that are only the extremities of the pale fibres that plunge into the plexus, and form part of the terminal nervous plate. Here the nervous fibres lose their envelopes, and are constituted only of naked cylinder axes, the elements of which separate to form the plexus. This, in its appearance as a whole, bears a great resemblance to that of a leaf, deprived of its parenchyma by maceration.

"As to the terminations in button-like enlargements, seen by M. Ranvier, we can also see them as well in nitrate of silver preparations as in those treated with gold chloride alone, without previous use of osmic acid. But we have, in these cases, to do with defective preparations, in which the continuity of the meshes is interrupted; in case of the negative images obtained by silver nitrate, by an excess of silver precipitate which obscures a part of the filaments of the plexus; in chloride of gold preparations, by an insufficient metallic deposit, stopping at the first branches of bifurcation of the terminal pale fibres, or coloring the filaments of the plexus only in an irregular and incomplete manner.

"I intend to show, in a future communication, that the nervous lamellae, formed by the terminal plexus, are alone, of all the elements forming the electric organ of the torpedo, the ones that accomplish the transformation of a force of tension into active force, the transformation of neurility into electricity."

THE NERVE TUBES IN T, AND THEIR RELATIONS WITH THE GANGLION CELLS.—M. L. RANVIER. *C. R. Acad. des Science*, Dec. 20, 1875. (Abstr. in *Revue des Sci. Med.*)

If we make an interstitial injection of osmic acid solution, by means of a Pravaz syringe, with a gold canula into the vertebral and gasserian ganglia of an adult rabbit, killed by hemorrhage, the ganglia immediately become black. They are next removed, placed in slightly iodized serum, and separated by means of needles at the end of twenty-four to forty-eight hours.

We then see that the nerve cells of these ganglia are unipolar, but the nerve tube which arises from each of these, after a longer or shorter course reaches one of the nerve tubes of the posterior root and unites with it at one of its annular constrictions.

The tubes which leave the ganglion cells are smooth ones. By joining the large nerve tubes of the posterior roots, they form a fibre bifurcated in a T or V. But all the fibres in T do not have a smooth branch; consequently, they are not all the result of a fusion of a fibre from the ganglion cells with an ordinary nerve tube. These Ys, with three large branches are therefore, probably formed by the anastomosis of several fibres, that have only a distant connection with the cell, and which have, therefore, taken on the aspect of ordinary nerve tubes.